COASTAL CONDITION ASSESSMENT OF HURRICANE KATRINA IMPACTS IN THE NORTHERN GULF OF MEXICO

Background and Rationale: Hurricane Katrina and the floods that followed have devastated coastal regions of Louisiana, Mississippi, and Alabama. Flood waters contaminated with microbial pathogens, toxic chemicals, heavy metals and other pollutants are expected to adversely impact coastal aquatic resources. Assessments of the ecological condition of estuaries and near-coastal waters in these states have been conducted annually since 2000 by EPA's National Coastal Assessment (NCA) program. Indicators of water quality, sediment quality, biological condition, coastal habitat and fish tissue chemistry were reported for the Gulf of Mexico region in National Coastal Condition Reports (Fig. 1). The data collected by NCA in 2004 and 2005 indicate the baseline condition of coastal waters prior to Hurricane Katrina.

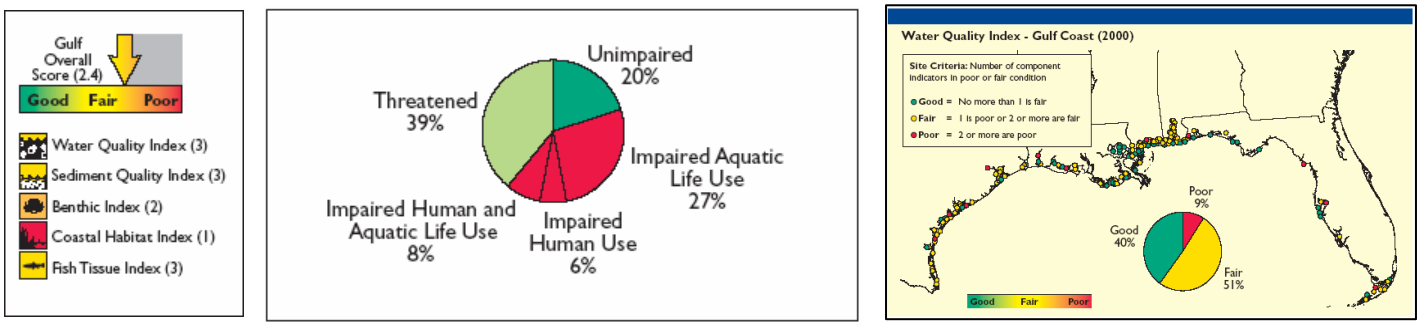
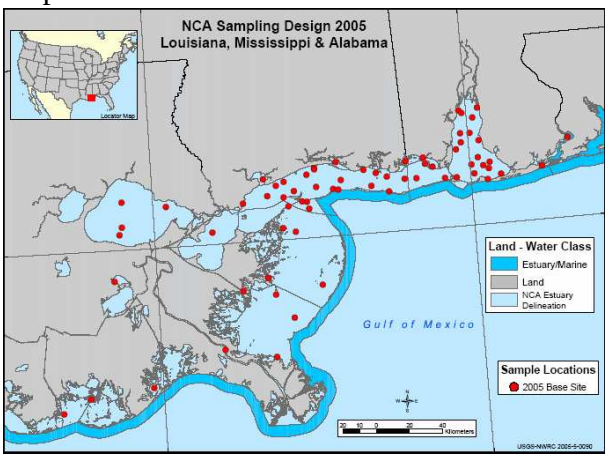


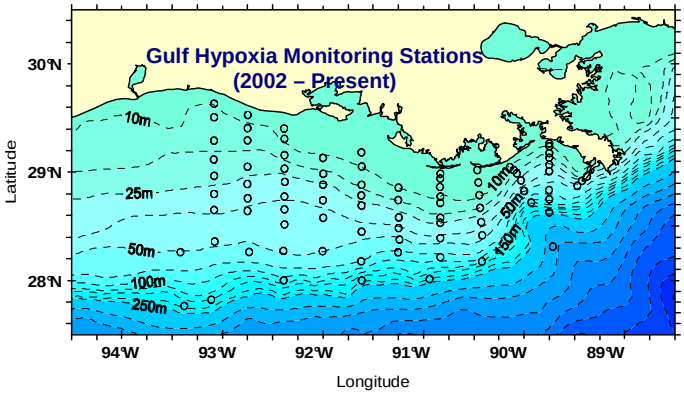
Figure 1. The overall condition of Gulf Coast estuaries is fair (left). Gulf Coast estuarine condition (center). Water quality index data for Gulf Coast estuaries (right). Source: USEPA, 2004. National Coastal Condition Report II, EPA-620/R-03/002.

Objectives:

1. Assess the ecological condition and trends in condition of coastal waters in Louisiana, Mississippi and Alabama associated with Hurricane Katrina and its aftermath.
2. Support local, state and national efforts to assess aquatic resources, identify the stressors that cause harm or deterioration of the resources, restore ecological condition and protect human health.

Existing Programs and Applications: EPA's Environmental Monitoring and Assessment Program (EMAP) National Coastal Assessment (NCA) has been designed to estimate the proportion of estuarine area that is in good condition at the state, regional and national scale. NCA has developed a compatible, probability survey design and a common set of ecological condition indicators. NCA was implemented by 24 U.S. coastal states to assess the condition of their coastal resources (http://www.epa.gov/owow/oceans/nccr/). ORD's Gulf of Mexico Hypoxia Monitoring and Modeling Program has developed a survey design and tools to monitor and model oceanographic processes and the development, persistence and areal extent of hypoxia along the inner continental shelf in response to Mississippi River nutrient loadings. The approaches, tools, data management and communication systems, and partnerships established through NCA and the Hypoxia Monitoring and Modeling Program will form the basis for implementing a regional assessment of ecological





condition in northern Gulf of Mexico coastal waters impacted by Hurricane Katrina.

Approach: A probability survey design will be used to locate thirty random stations within the coastal waters from Dauphin Island, AL to Lake Borgne, LA. A suite of NCA ecological indicators of sediment and water quality, and benthic condition will be collected. Samples for bacterial enumeration and levels of fecal contaminants in water will be assessed as well. A baseline survey of all indicators will be conducted in late September/early October to assess the condition of coastal waters immediately following Hurricane Katrina's impact. The survey will be repeated over the course of a year (4-5 events) with the collection of water quality indicators samples on a bi-monthly basis to capture short-term changes in condition from the movement and dispersion of contaminants from Lake Pontchartrain into the coastal waters of Louisiana and Mississippi; the full suite of water, sediment and benthic indicators will be sampled at 6 month and 1 year intervals.

An additional 10 stations will be added to the ongoing Gulf of Mexico Hypoxia Monitoring surveys to characterize the near-shore component along the western outflow of the Mississippi River. The stations will be sampled quarterly using a suite of NCA ecological indicators of sediment and water quality, and benthic condition. Samples for bacterial enumeration and levels of fecal contaminants in water will be assessed as well.

Products and Outcomes: Scientifically-defensible approaches and tools needed to estimate the proportion of coastal waters in good, fair and poor condition have already been developed and utilized for national, regional and state-based assessments. The proposed approach will use a standard suite of condition indicators and tools to assess the impacts of Hurricane Katrina and contaminated flood waters on coastal aquatic resources and the changes in condition over time; baseline condition indicators for the region are available through NCA (http://www.epa.gov/owow/oceans/nccr/). The products will be made available to local, state, regional, and federal decision-makers to support environmental and public health decisions, recovery and restoration efforts.

Collaboration: This project will be a collaborative effort involving U.S. EPA's Office of Research and Development and Office of Water in coordination with Regions 4 & 6.

Contacts:

Craig Vogt
Deputy Director
Oceans and Coastal Protection Division
USEPA Office of Water
1200 Pennsylvania Ave., NW 4504T
Washington, DC 2060
TEL: 202-566-1235 FAX: 202-566-1334
EMAIL: vogt.craig@epa.gov

Rick Greene
Chief, Ecosystem Dynamics & Effects Branch
Gulf Ecology Division
National Health and Environmental Effects Research Laboratory
USEPA Office of Research and Development
1 Sabine Island Dr., Gulf Breeze, FL 32561-5299
TEL: 850-934-2497 FAX: 850-934-2401
EMAIL: greene.rick@epa.gov

Table 1. List of analytes in sediment/benthos and water samples

I. Sediment/benthos:

Polynuclear Aromatic Hydrocarbons (PAHs)

Acenaphthene
Anthracene
Benz(a)anthracene
Benzo(a)pyrene
Biphenyl
Chrysene
Dibenz(a,h)anthracene
Dibenzothiophene
2,6-dimethylnaphthalene
Fluoranthene
Fluorene
2-methylnaphthalene
1-methylnaphthalene
1-methylphenanthrene
2,6-dimethylnaphtalene
Naphthalene
Pyrene
Benzo(b)fluoranthene
Acenaphthylene
Benzo(k)fluoranthene
Benzo(g,h,i)perylene
Ideno(1,2,3-c,d)pyrene
2,3,5-trimethylnaphthalene

21 PCB Congeners:

PCB #	Compound Name
8	2,4'-dichlorobiphenyl
18	2,2',5-trichlorobiphenyl
28	2,4,4'-trichlorobiphenyl
44	2,2',3,5'-tetrachlorobiphenyl
52	2,2',5,5'-tetrachlorobiphenyl
66	2,3',4,4'-tetrachlorobiphenyl
101	2,2',4,5,5'-pentachlorobiphenyl
105	2,3,3',4,4'-pentachlorobiphenyl
110/77	2,3,3',4',6-pentachlorobiphenyl 3,3',4,4'-tetrachlorobiphenyl
118	2,3,4,4',5-pentachlorobiphenyl
126	3,3,4,4',5-pentachlorobiphenyl
128	2,2',3,3',4,4'-hexachlorobiphenyl
138	2,2',3,4,4',5'-hexachlorobiphenyl
153	2,2',4,4',5,5'-hexachlorobiphenyl
170	2,2',3,3',4,4',5-heptachlorobiphenyl
180	2,2',3,4,4',5,5'-heptachlorobiphenyl
187	2,2',3,4',5,5',6-heptachlorobiphenyl
195	2,2',3,3',4,4',5,6-octachlorobiphenyl
206	2,2',3,3',4,4',5,5',6-nonachlorobiphenyl
209	2,2'3,3',4,4',5,5',6,6'-decachlorobiphenyl

DDT and metabolites

2,4'-DDD
4,4'-DDD
2,4'-DDE
4,4'-DDE
2,4'-DDT
4,4'-DDT

Chlorinated pesticides other than DDT

Aldrin
Alpha-Chlordane
Dieldrin
Endosulfan I
Endosulfan II
Endosulfan sulfate
Endrin
Heptachlor
Heptachlor epoxide
Hexachlorobenzene
Lindane (gamma-BHC)
Mirex
Toxaphene
Trans-Nonachlor

Metals

Aluminum
Antimony (sediment, only)
Arsenic
Cadmium
Chromium
Copper
Iron
Lead
Manganese (sediment, only)
Mercury
Nickel
Selenium
Silver
Tin
Zinc

Other Measurements

Total organic carbon (sediments)
Benthic invertebrate enumeration & identification

II. Water:

Pathogens
Metals
Organochlorine pesticides
PAH's
Oil & grease
Chlorophyll a
Total nitrogen
Total phosphorus
Dissolved nitrate
Dissolved nitrite
Dissolved orthophosphate
Dissolved ammonium
Total suspended solids
Dissolved organic carbon